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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,648	11/21/2003	Heinz-Peter Frerichs	Micronas.7388	2362

7590 06/08/2006  
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EXAMINER

INGHAM, JOHN C

ART UNIT PAPER NUMBER

2814

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No. 10/719,648	Applicant(s) FRERICHS, HEINZ-PETER	
	Examiner John C. Ingham	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 May 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Priority***

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 120 as follows: (See MPEP 201.11 and 37 CFR 1.78 for filing of petition)

The claim for priority must be submitted within the later of four months from the actual filing date of the later-filed application or sixteen months from the filing date of the prior-filed application.

Otherwise, a petition to accept an unintentionally delayed claim under 35 U.S.C. 120, 121, or 365(c) for the benefit of a prior-filed application must be accompanied by:

- (i) The reference required by 35 U.S.C. 120 and paragraph (a)(2) of this section to the prior-filed application, unless previously submitted;
- (ii) The surcharge set forth in § 1.17(t); and
- (iii) A statement that the entire delay between the date the claim was due under paragraph (a)(2)(ii) of this section and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional.

2. When the claim of priority is perfected between the instant application and prior-filed application (app. #10/121,935 now US patent 6,929,728), the following rejections will still be maintained. The publication of the prior-filed application (US 2002/0157950), which is more than one year before the filing date of the instant application, is available as a 102(b) reference

### ***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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4. Claims **1-7 and 15-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Frerichs (US 2002/0157950), hereinafter "Frerichs '950", in view of Tada (US 6,525,390), hereinafter "Tada."

5. Regarding claims **1 and 15**, Frerichs '950 discloses in Figures 1 and 2 a sensor for measuring an ambient parameter, comprising: a drain (5); a source (2); a channel region (4) disposed between the drain and the source; a conductive guard ring (1) disposed outside the channel region; a sensitive gate layer (8) with a potential that depends on the ambient parameter; and an air gap (10) disposed between the gate layer and the channel region. Furthermore, with regard to claim 1, Frerichs '950 discloses in Figures 1 and 2 a substrate (11) with drain and source disposed thereon.

Frerichs '950 also discloses in Figure 2 an insulating layer (14) disposed between the guard ring (1) and the channel region (4), the insulating layer having a surface (15) on which is disposed a ring structure (7). Frerichs '950 does not, however, specifically disclose the ring structure (7) having a surface conductivity different from a surface conductivity of a remaining portion of the surface of the insulating layer (14).

Tada discloses in Figure 34a a ring structure (207 along with 220, formed of resistive aluminum) having a surface conductivity different from a surface conductivity of a remaining portion (figure 34b, items 211 and 212). Motivations to do so include the desirability of having a uniform potential gradient across the field oxide film (Tada col. 18 ln. 16), avoiding voltage concentrations between the gate and drain regions, and reduction of the intensity of the electric fields associated with PN junction termination. Items 211 and 212 in Figure 34b are insulation films, and are of similar structure as the

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field oxide film (8) in Figure 2. It is well known that field oxide is synonymous with thick silicon dioxide.

It would have been obvious to one of ordinary skill in the art at the time of the invention to improve upon the ring structure of Frerichs '950 by using the teachings of Tada to create a field plate with annular ring structures of a second conductivity type upon it.

6. Regarding claims **2 and 16**, the sensor structure taught by Frerichs '950 in view of Tada (fig. 34a) discloses the sensor of claims 1 and 15, further comprising surface profiling formed with respect to the insulating layer and having at least one elevation (207) and at least one depression (212), and disposed between the guard ring and the channel region. Refer to Tada, figure 4, for the appropriate cross section.

7. With regards to claims **3 and 20**, Frerichs '950 discloses the sensor of claims 2 and 15, further comprising a second insulating layer disposed over the channel region (§ 12).

8. With regards to claim **4**, Tada discloses in figure 34a a ring structure (207 along with 220), which is comprised of an insulating material (resistive aluminum) disposed on the insulating layer (figure 34b, items 211 and 212).

9. With regards to claim **5**, Tada discloses in figure 34a a ring structure (207 along with 220), wherein the ring structure comprises a concentric structure.

10. With regards to claims **6 and 17**, Frerichs '950 discloses the sensor of claims 2 and 15, where the ambient parameter comprises a gas concentration (§ 11).

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11. With regards to claims **7 and 18**, Frerichs '950 discloses the sensor of claims 2 and 15, where the parameter comprises an ion concentration (§ 2).

12. Regarding claim **19**, Frerichs '950 discloses the sensor of claim 15, where the insulating layer (14) comprises an oxide layer (§ 7).

13. Claims **8-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Frerichs '950 and Tada as applied to claims 1-7 above, and further in view of Paris, R. et al, hereinafter "Paris".

Regarding claim **8**, Frerichs '950 discloses in Figures 1 and 2 a sensor for measuring a concentration of an ambient parameter, comprising: a substrate (11); a channel region (4) formed in the substrate; a conductive guard ring (1) arranged outside the channel region; a sensitive gate layer (8) whose potential depends on the concentration of the ambient parameter, an air gap (10) disposed between the gate layer and the channel region; an oxide layer (14) disposed between the guard ring and the channel region, with the surface (13) of the oxide layer having a ring structure (7) arranged thereon. As stated previously, Tada discloses in Figure 34a a ring structure (207 along with 220, formed of resistive aluminum) having a surface conductivity different from a surface conductivity of a remaining portion (figure 34b, items 211 and 212).

The combination of Frerichs '950 and Tada does not teach a source and drain forming a field-effect transistor, the transistor being spatially separated from the air gap

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between the gate layer and the channel region, the transistor having a gate that is connected by an electrode to the channel region.

Paris discloses in figure 1 a source and drain forming a field-effect transistor (item FET in figure), the transistor being spatially separated from the air gap (area bounded by the gate, nitride, and distance pieces) between the gate layer and the channel region (area under the substrate between the guard rings), the transistor having a gate that is connected by an electrode to the channel region. The motivation to do so includes the positive effect of the CCFET structure in regards to temperature dependency and long term stability (Paris, pg. 424). It would have been obvious to one of ordinary skill in the art at the time of the invention to create a capacitively controlled transistor by adding the teachings of Paris to the device already created by Frerichs '950 and Tada in order to positively affect the temperature dependency.

14. Regarding claim 9, Frerichs '950 discloses the sensor of claim 8, where the ambient parameter comprises a gas (§ 11).

15. Regarding claim 10, the sensor structure taught by Frerichs '950 in view of Tada (fig. 34a) discloses the sensor of claim 8, further comprising surface profiling formed with respect to the insulating layer and having at least one elevation (207) and at least one depression (212), and disposed between the guard ring and the channel region. Refer to Tada, figure 4, for the appropriate cross section.

16. Regarding claim 11, Frerichs '950 discloses the sensor of claim 8, further comprising an insulating thin layer disposed over the channel region (§ 12).

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17. Regarding claim 12, Tada discloses in figure 34a a ring structure (207 along with 220), which is comprised of an insulating material (resistive aluminum) disposed on the oxide (figure 34b, items 211 and 212).

18. Regarding claim 13, Tada discloses in figure 34a a ring structure (207 along with 220), wherein the ring structure comprises a concentric structure.

19. Regarding claim 14, Frerichs '950 discloses the sensor of claim 8, where the ambient parameter comprises an ion concentration (§ 2).

### ***Response to Arguments***

20. Applicant's arguments filed November 25<sup>th</sup>, 2005 have been fully considered but they are not persuasive. These arguments are addressed in the Final Action dated 21 December 2005.

21. Applicant's arguments and remarks filed 22 May 2006, regarding priority, have been addressed in paragraphs 1 and 2 of this Action. Specifically, the Frerichs publication will remain available as prior art.

### ***Conclusion***

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not



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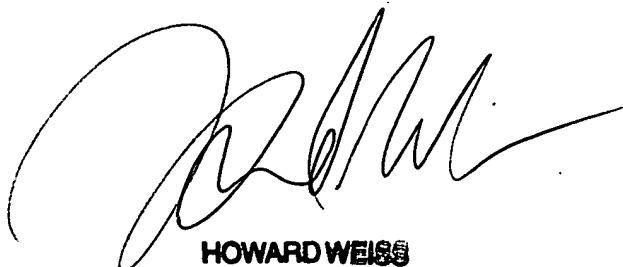
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jci



**HOWARD WEISS**  
**PRIMARY EXAMINER**